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and strychnine, however, have so much similarity of action upon the spinal cord that the use of one of them would probably somewhat increase any danger that may have been incurred by the administration of large doses of the other.

On the other hand, atropine has little influence upon the spinal cord, its general physiological action being quite distinct from that of cocaine or strychnine. It is therefore probable that by the consentaneous use of atropine and strychnine, or of atropine and cocaine, the physician may obtain the advantage of what, many years ago, I spoke of as the "crossed action" of drugs; the two drugs touching and reinforcing one another in their influence upon the respiratory functions, and spreading wide apart from each other in their unwished for and deleterious effects.

In conclusion, for the sake of any one who may be interested in the details of this research, it may be stated that it will shortly be published in full in the *English Journal of Physiology*.

#### LETTERS TO THE EDITOR.

*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

#### Man and the Glacial Period.

A MISLEADING paragraph in Dr. Brinton's otherwise excellent review of a recent publication under the above caption,<sup>1</sup> in connection with the Reverend Professor Wright's response,<sup>2</sup> seems to demand a further word. Dr. Brinton errs in saying "As a glacialist, the author of this volume stands among the first in the country, and his long study of that remarkable period in the geologic history of our planet invests everything he says about it with uncommon authority."

Within recent years there has grown up a new branch of geologic science, which has been called by its devotees "geomorphic geology," "geomorphology," and still more acceptably "geomorphy," and which is frequently spoken of as the "New Geology." It is the function of geomorphy to read geologic history from earth-forms, as the older geology read history from deposits and their fossils. Beginning a score of years ago with Powell's conception of the "base-level," at which erosion ceases, the primary idea has extended and expanded until now the geologist not only recognizes ancient base-levels in certain topographic forms, but is able to determine from steepness of slopes and other topographic relations the rate at which erosion has proceeded in the past, and thereby the attitude and altitude of the land during earlier ages. This branch of science has been successfully pursued by a number of geologists in this country and a few abroad, and is taught in three or four universities; and it has been found of especial use in the study of glacial deposits. It is, however, a sealed book to Professor Wright; not a syllable in his latest work, or in any other of his many publications, or in his public utterances before scientific societies, suggests that he is aware of the existence of the New Geology.

Within two decades the discriminating genius of Chamberlin and a score of fellow-workers in this country has thrown much light on the events and episodes of the glacial period. Largely through the application of geomorphy, it has been shown that the glacial deposits of north-eastern America represent two, three, or more distinct ice invasions occurring at different epochs in a long period, and that the earliest of these deposits is many times older than the latest — indeed the leading authorities agree that if the post-glacial period be represented by unity, then the entire glacial period must be represented by two figures. This succession of ice deposits and ice invasions is not, indeed, recognized by some of those glacialists whose observations have been confined to regions in which only a single deposit is represented; but with one or two exceptions (including our author's namesake, A. A. Wright, professor of geology at Oberlin) every geologist who has studied the

marginal drift holds to the bipartite or tripartite or multipartite character of glacial deposits and glacial history. This succession is not admitted by the Reverend Professor Wright. Accordingly, his ideas concerning early man have no definite time-basis and cannot be discussed intelligently by modern archaeologists — it would be as easy to discuss the opinions of an author who confounded not only all the successive dynasties recorded in the monuments and hieroglyphs of Egypt but also the works of the modern fellahin, or of a genealogist who argued that the families of a dozen successive generations dined together at the same board. As an exposition of the antiquity of man and the glacial theory, "Man and the Glacial Period" is a cry from the tombs of a dead past; it represents the primitive knowledge of a quarter-century ago, and might then have been considered authoritative; but its publication to-day is an offense to science.

Professor Wright objects to Dr. Brinton's "flippant treatment" of the Nampa figurine, and insists that a geologist who happened to detect the fraud on the ground should burden scientific literature with some detailed statement. It does not seem to occur to him that the gentleman in question avoided rushing into print simply because the fraud was too transparent to deceive geologists, who alone are competent to deal with questions concerning the geologic antiquity of man. Respectable and cultured gentlemen seem indeed to have been deceived by this alleged "find," — but they were not geologists; so, too, respectable and cultured people, including an illustrious naturalist, have been deluded by a Philadelphia adventurer with an alleged motor, — but no physicist was deceived; in like manner, intelligent and honest people have been deluded by a brazen pretender into the belief that the heavens may be frightened into tears by cannon-ading — but the meteorologists are not deluded; and the circle-squares and perpetual-motion inventors are abroad in the land, yet the mathematicians and the mechanicians are not deceived. And it would be folly for the physicist, the meteorologist, the mathematician, and the mechanician to rush into print and advertise each new fraud, for thereby the press would be flooded and libraries crowded, while fraud would only flourish the more for the advertising. So long as poor human nature remains as it is, the knave and the dupe we shall always have with us; and it is to be regretted that a presumably competent authority in his own specialty of theology should be willing to assume either rôle in another line of activity.

The author of the work has indeed visited many existing glaciers, and his observations would be of value to geologists if they could be accepted with confidence. A case in point is his measurement of the rate of flow in Muir glacier, in which he employed primitive methods and recorded a result so extraordinary as to challenge credulity. Subsequently, the measurement was repeated by Professor Reid by a superior method, with a widely different result which is in harmony with all other observations. Instead of acknowledging his evident blunder, or even passing over the matter in silence, Professor Wright has the assurance to "talk round" the issue (p. 47), and thereby impugns the excellent work of a later observer.

"Man and the Glacial Period" is published by a reputable house as one of an "International Scientific Series," and thereby acquires a respectability to which otherwise it could not aspire. Dr. Brinton has fairly, albeit charitably, shown its weakness from the standpoint of anthropology; other reviewers have shown that it sinks even lower when viewed from the standpoint of geology.<sup>3</sup> In other ways, too, the title-page conveys erroneous impressions as to the profession and standing of the author. Thus, he takes unto himself the title "Assistant on the United States Geological Survey." The facts are, that he was temporarily employed by one of the collaborators of the bureau largely for the purpose of testing his competence as an observer; and that the test resulted unsatisfactorily to the bureau and was brought to an end several years ago.

In brief, the world would be wiser if the book were not written.

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<sup>1</sup> Science, vol. xx., 1892, p. 249.

<sup>2</sup> Op. cit., pp. 275-277.

<sup>3</sup> E.g., Professor T. C. Chamberlin in *The Dial*, Vol. XIII., pp. 303-306, November 16, 1892.